Brenell

MARK 5 TYPE M
SERIES 3
TAPE RECORDER

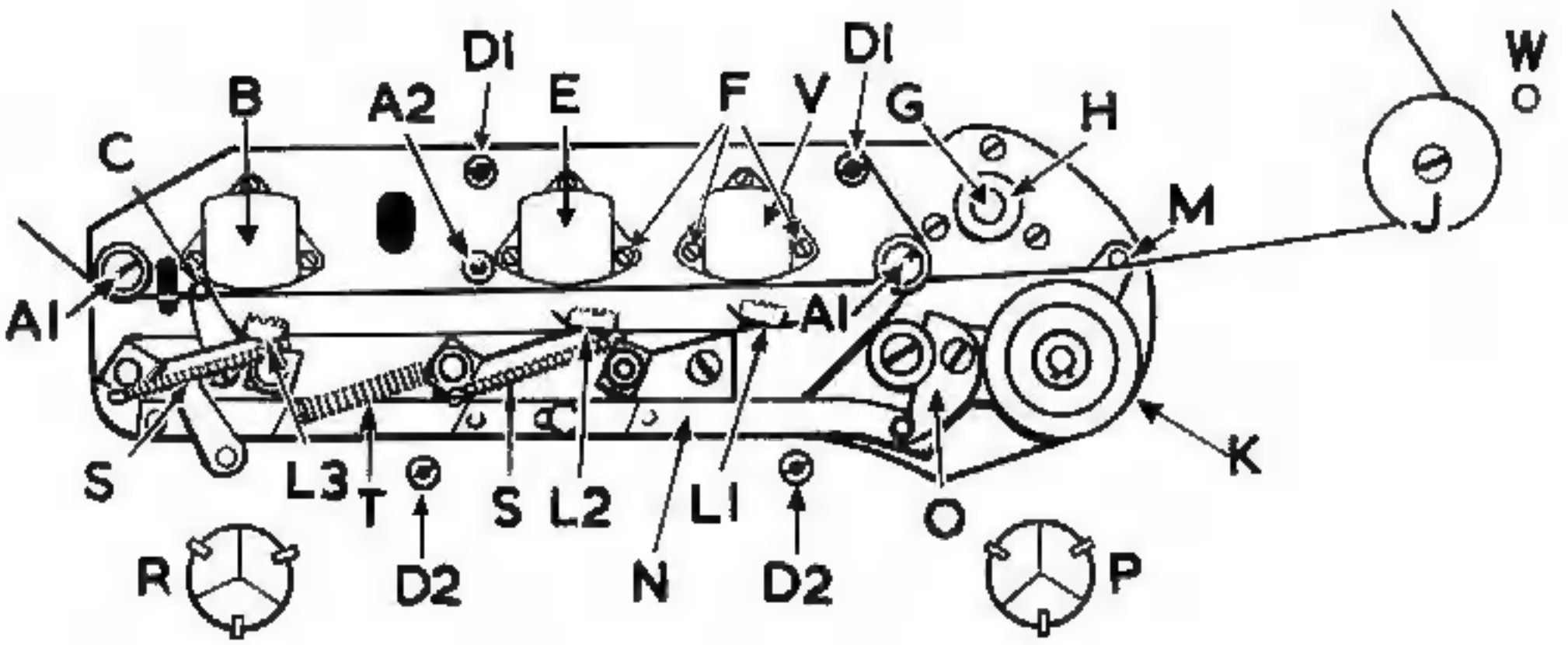
OPERATING INSTRUCTIONS

PRICE 5/-

IMPORTANT

Before attempting to operate this instrument, be sure to study carefully these instructions. In the event of damage being done to the Recorder through wrong connection or other misuse, the manufacturers can accept no responsibility.

1. Feed Spool.
2. Spool retaining nuts.
3. Take-up spool.
4. Guide Pin.
5. Adjustable Rotary Tape Guide.
6. Revolution Counter.
7. Record Playback Switch.
8. Record Lock Button.
9. Pause Control.
10. Superimpose Control.
11. Rewind Switch.
12. Deck retaining screws.
13. Speed Selector Switch.
14. Fixed Head Cover.
15. Clip-on Head Cover.



TAPE LACING CHART

A1, A2. Tape Guides.

B. Erase Head.

C. Superimpose Release Pin.

D1. Retaining Post for clip-on Head Cover.

D2. Retaining Post for fixed Head Cover.

E. Record Head.

F. Azimuth adjustment Screws.

G. Capstan Shaft.

H. Capstan Sleeve.

J. Adjustable Tape Guide.

K. Rubber Pinch Wheel.

L1, L2, L3. Pressure Pads.

M. Take-up Pin.

N. Pressure Pad operating lever.

O. Crescent-shaped lever.

P. Pause Control.

R. Superimpose Control.

S. Pressure Pad Springs.

T. 'N' Lever Release Spring.

V. Replay (Playback) Head.

W. Supplementary Guide Pillar.

Speeds available
with small capstan fitted to G

$7\frac{1}{2}$ $3\frac{3}{4}$ $1\frac{7}{8}$

The white dot on the switch should be set under the speed required.

Speeds available
with large capstan fitted to G

$3\frac{3}{4}$ $7\frac{1}{2}$ 15

The white line on the switch should be set above the speed required.

Please note:—The speed selector switch does not rotate through 360°

MAINS CABLE

This is a 3-cored cable which is stored in the left-hand rear compartment.

Choose a suitable 3-pin mains plug and connect the **green** *lead to the earth pin (largest) and the two remaining leads to the smaller pins. If a 2-pin plug must be used, the green (earth) lead must be left disconnected and suitably insulated.*

MAINS ADJUSTMENT PANEL

Situated within right-hand compartment (viewed from rear) contains the mains fuse (½" 2 amp cartridge) which is easily renewed.

Ensure that the plug is set to the correct voltage position for your electricity supply.

i.e. 240v for mains of 220v to 250v.
210v for mains of 200v to 220v.
*110v for mains of 100v to 125v.
(The power consumption is approx. 120 watts).

A converter to enable the machine to be operated from D.C. mains or a car battery can be obtained from your dealer.

**Use ONLY on the special model fitted with 117v motors and suitable ONLY for use on 100–125v A.C. supplies. DO NOT operate the special model on higher voltage mains supplies unless a suitable step down transformer is used.*

The mains switch is mounted on this panel and will switch the mains power to both deck and amplifiers.

Humdinger: A device, mounted on the mains adjustment panel, for minimising hum level. Simply adjust for the minimum hum level with volume and bass controls advanced to maximum.

Should there be no perceptible change in the hum level, set the control to approximately midway position.

DECK OPERATION

Lace the tape as indicated in the diagram. (*The tape movement during the recording or replay processes is always from the left-hand spool, which is known as the "Feed" spool, to the right-hand or "Take-up" spool.*)

(*Two separate recordings may be made on each tape by turning over the spool of tape because only the upper half of the tape is used when recording.*)

Hub-locks

Knurled edge lock nuts are supplied for retaining the tape spools on the hubs. *Whilst it is not essential to fit these nuts when recording, or replaying the tape, they should be used when transporting the machine in order to retain the spools in position.*

Should the nuts be omitted during fast wind or re-wind, it is inevitable that a certain amount of vibration of the spool will occur.

Adjustable rotary tape guide

In order to enable spools of varied types to be used without the edge of the spool fouling the tape, an adjustable rotary guide is fitted to the Mark 5 type "M" deck.

Adjust as required by releasing the lower milled circular nut and raising or lowering the guide by rotating the upper (unmilled) portion—do **not** *unscrew the small countersunk screw.*

Finally ensure that the lower locking screw is re-tightened.

Speed change Switch

This 3-position switch gives speeds of:

(a) with large diameter Capstan Sleeve—15, 7½, 3¾ i.p.s.
(b) with small diameter Capstan Sleeve—7½, 3¾, 1⅞ i.p.s.

The switch does not fully rotate. The figures above the switch are for use with the smaller sleeve and the lower with the larger sleeve.

The sleeves are retained on the capstan shaft with grub screws.

Ensure screw is tight, or speed fluctuations will occur. (NOTE:—The Capstan Sleeve should be fixed with the grub screw near the Deck Plate, allowing ⅛" clearance between end of sleeve and deck plate.)

Re-wind Switch

Fast winding and re-winding is effected by simply turning the "re-wind" switch to the right (wind) or left (re-wind) as required.

When stopping the tape, the re-wind switch must be brought **quickly** to the central position in order to allow instantaneous action by both brakes.

(*An alternative method is to switch—***very quickly indeed***—from the re-wind to the wind position (or vice versa), thus transferring the power from one motor to the other and achieving a gradual slowing down of the tape, then, just as the tape movement is about to change, turn the switch to the central 'stop' position. This method requires a little practice but is mentioned at the request of a number of people, who, having learned to use it, prefer it to the abrupt arresting of the tape movement.*)

Record/Replay Switch

To **record** it is necessary to release the locking mechanisms of the switch by pressing the small button adjacent to the switch.

To **replay:** simply switch in the opposite direction from "record". (*It should be noted that in the "record" position, the recording amplifier and the re-*

play amplifier will be operative, whilst in the replay position the recording amplifier will be inoperative and the meter needle will move to the right-hand side (red) of the scale.

In the "stop" position the recording amplifier is operative to enable the recording level to be ascertained. (The meter needle should be zeroed on the left-hand side of the scale with volume controls set to minimum.)

Pause Control

When pulled towards the operator this control arrests the tape movement to permit the easy omission of unwanted passages of music or announcements whilst recording.

Other uses will be found for this control—for instance when editing.

Superimposing

A switch has been incorporated to enable the tape to be removed from the Erase Head in order to record a second time without completely erasing the original recording, *i.e.* to add speech to music, so that a musical background is available. This method is preferable to switching off the Erase Head supply.

It must, however, be remembered that, in common with all tape recorders fitted with superimposing facilities, the bias for the second recording will partially erase the first recording and therefore the recording which may be reduced in level should be recorded first, i.e. record the music before the speech.

Revolution Counter

A digital revolution counter is coupled to the take-up spooling mechanism to assist in the quick and easy identification of selected recordings. This counter is re-set to zero by moving the milled edged wheel forward (it moves the digits in one direction only).

RECORDING AMPLIFIER

This amplifier is for recording purposes only and is independent of the replay amplifier.

Two input sockets, each with a gain control are provided. The **microphone** socket is for direct connection to High impedance type microphone (condenser types excepted.) A Low-impedance microphone will require a suitable matching transformer. If the best performance is to be obtained from the High impedance type of microphone, the cable length recommended by the manufacturers of the microphone should not be exceeded.

The "Radio" input socket is for signals of much higher level than one may feed into the microphone socket, and therefore this socket should be used when recording from radio receivers, radiograms or F.M. Tuners.

The average radio receiver need only have its extension loudspeaker sockets (even though these are for **low**-impedance extension loudspeakers) connected to the radio socket of the recording amplifier. The signals presented to these input sockets may be mixed by manipulating the respective gain controls. When mixing, the operator will require to know exactly the proportions of each signal being mixed, and for this to be ascertained, an outlet is provided at the **Monitor** socket. (A pair of high-impedance headphones — 2,000 to 4,000 ohms — should be plugged into this socket.)

When requiring to mix more than one microphone signal, it should be borne in mind that an external mixer unit will be required—the output of such mixer being coupled to either of the input sockets of the recording amplifier, according to the degree of amplification by the mixer unit. Normally a mixer does not give a greatly amplified signal, and therefore mixers are usually connected to the microphone socket. Perhaps it should be mentioned at this juncture that "resistive" mixers, *i.e.* mixers without means of amplification, will actually give a **decreased** signal from that obtainable directly from the microphone.

Frequency Correction Switch

A four position switch which should be set to coincide with the speed at which the tape is being recorded or replayed.

Recording Level Meter

To ascertain the level of sound being fed to the recording head, a highly sensitive valve-volt meter is incorporated. This meter has a "right-hand mechanical zero", *i.e.* without current passing through the meter, the needle will point to the right-hand side of the scale.

However, when the recording amplifier is operative *i.e.* with the deck switched to "record" or "stop" current will pass through the meter and the needle will travel to the left-hand side of the scale. It may be accurately zeroed on the left-hand side by adjusting the small control situated to the lower right-hand side of the meter. This adjustment should be made without any signal being applied to the meter; *i.e.* reduce input gain controls to minimum.

Having zeroed the meter in this way, 1 milli amp of

current will be passing through it and any signal causing it to move will actually be reducing the current through this meter, thus no damage can occur if an excessively high signal is applied.

However, too high a recording signal will cause "Over Modulation" of the tape. This will cause distortion and make erasure of the signal from the tape somewhat difficult.

It will have been realised that, with the meter operative with the deck mechanism stationary, a correct level may be ascertained before attempting to record and therefore the input gain control(s) should be carefully advanced until the **loudest** signals, *i.e.* "peak level", cause the meter needle to just meet the red portion of the scale—*i.e.* "7" on the meter. A slight excursion into the red portion of the scale will not, however, cause serious distortion.

Having ascertained the correct setting for the respective gain controls, the operator may now switch the deck to "Record" and the recording process will commence. It is recommended, however, that before switching the deck to "Record" the input gain control be reduced to minimum and returned to the pre-determined level after the deck has been started.

This method will ensure a professional "fade in" of signal and will allow a few seconds for the deck to reach the correct speed.

Superimposing

It is quite easy to add further signals to those already recorded by operating the "superimpose" switch on the deck.

One should, however, make a habit of returning this switch to normal immediately after use or recordings which should be erased may be inadvertently retained.

REPLAY

On switching the deck to replay, power is disconnected from the recording amplifier and the meter needle will move to the right-hand side of the scale.

The "power" indicator lamp, however, remains "on" until such time as the mains input switch at the rear of the machine is switched off or the mains supply otherwise disconnected.

Replay Amplifier

This amplifier is independent of the recording amplifier, except that the one frequency correction switch adjusts the compensation circuits in both amplifiers; therefore, if replay only is to be carried out, this switch should be adjusted to coincide with the tape speed.

As separate heads are incorporated for recording and replay purposes, it is possible to listen to the recording a fraction of a second after the recording has been made. (The time delay will depend on the speed at which the deck is operated. It is essential that primary consideration be given to obtaining the **correct recording level** if the best possible quality of recording is to be obtained at the particular speed selected.)

Gain, Treble and Bass controls are fitted on this amplifier and these may be adjusted to the operator's particular pleasure. It should be borne in mind, however, that if a tape has been correctly modulated, the full output of the amplifier (2 watts) will be reached long before the gain control has reached maximum and that the excessive advancement of the gain control will, as in all amplifiers which have a reserve of amplification, cause unwarranted amplification of inherent valve, etc. noises.

It will again be noticed that with the frequency correction switch set for compensation at the slower speeds, the background noise will tend to be higher than with the compensation set for higher speeds.

Three sockets are provided in the replay amplifier; for **Extension Loudspeaker** of 15 ohms impedance (for absolutely correct matching), for **External Amplifier** (this signal is frequency corrected and should be coupled to an amplifier requiring a "flat" input response. (Please note that some amplifiers are designed for direct connection to a tape head; do **not** feed the above signal into such amplifiers unless they have an "extra" or "auxiliary" socket which specifies a "flat" input response.)

The output at the "External Amplifier" socket is approx. 200 millivolts at 47,000 ohms impedance. Should this be too high for your particular equipment, attenuation may be obtained by feeding this 200 m.v. signal across a 50,000 ohm potentiometer (screened to avoid introducing hum) and feeding the centre tag (slider contact) and earthy side of the potentiometer to the input socket of the external amplifier. (Screened leads must be used or excessive hum will be introduced.) Alternatively, a fixed attenuator may be made by using 2 resistors in lieu of the potentiometer. The External Amplifier signal may also be used for feeding a pair of high-impedance headphones (2,000 ohms or higher) if desired. The third socket, **"Straight Amplifier"**, enables, by insertion of a standard jack plug, the replay amplifier to be disconnected from its head correction stage, thus making it suitable for use (without the deck mechanism) for the reproduction of radio programmes from tuner units, gramophone records from most types of pick-up and from microphones for low powered public address.

The bass and treble controls remain in circuit on "straight amplifier" and the Frequency Connection

switch may be used to give a small degree of fixed tonal variation (recommended position $3\frac{3}{4}$.)

When using the replay amplifier for "tape monitoring" with a microphone input, the delayed replay may be arranged to be "heard" by the microphone and an echo effect produced. Should this effect not be desired, the operator may insert **low**-impedance (approx. 20 ohms) phones (or phones of medium impedance with a 15 ohm load resistor across them) into the "external speaker" socket, thus muting the internal speaker. Should the "tape monitoring" facility not be required, merely turn down its gain control.

GENERAL INFORMATION

When recording from radio receivers, **direct** connection to the Extension Speaker sockets or tape sockets of the receivers should be made, using screened cables.

If such sockets are not provided, do not attempt to make direct connection, as the receiver is probably of the AC/DC type and will require modifications to make it safe for direct connection.

This advice applies also to direct connection with T.V. receivers, almost all of which are now AC/DC models.

Failure to observe the above may lead to electrical shocks of a lethal nature.

Pausing

It is recommended that the following procedure be followed when using the pause control:—

At the end of the recording period, reduce the recording amplifier's gain control to minimum before operating the pause mechanism and release the pause mechanism before increasing the gain control when recording is to be resumed.

In this way a professional type fade out and in will be accomplished.

ECHO PRODUCTION

Two methods are suggested:—

1. To add echo to a previous recording, feed the "External Amp" output into the "Radio" input socket, operate the superimpose control, switch to Record and carefully control the echo level by means of the Radio Volume Control (monitor the recording.)

2. To add echo whilst recording, plug in microphone to recording amplifier, switch to Record and advance the replay Volume Control so that any sound being recorded is replayed, picked up by the microphone and re-recorded. Care must be taken not to advance the replay volume too far or put the microphone too close to the loudspeaker otherwise a howl will build up and be recorded. Four different reverberation times are obtainable—one at each tape speed.

Microphones

Seldom is any one type of microphone suitable for every circumstance and we recommend they be used as follows :—

Ribbon: For high quality "live" musical recordings (indoors).

Dynamic (moving coil)—for indoor and outdoor use: speech, music, etc.

Crystal—Principally for speech recordings.

Selecting an Extension Loudspeaker

The choice of a loudspeaker is a very personal thing, and we suggest that the listener should endeavour to hear a variety of makes in use with the tape recorder.

If the speakers can be heard within the listener's own home, so much the better, as room acoustics must be taken into account when choosing a loudspeaker.

Recording from Gramophone Pick-ups

Owing to the great variety available, it is impossible to advise exactly how every pick-up should be connected for recording purposes.

It must be borne in mind, however, that the signal output directly from a pick-up, is often far from "flat", *i.e.* it interprets the disc's recording characteristic, and therefore, if satisfactory recordings from the disc and pick up are to be made, a suitable frequency correction network must be used between the pick-up and the tape recording amplifier.

Advice on such networks is normally available from the pick-up manufacturers.

SERVICING

For the continued efficient operating of the machine, it is essential to ensure that the heads, pinch wheel and tape guides, are clean and free from tape oxide.

A very thin film of dirt or oxide on the heads will seriously mar the frequency response and reduce the volume level, whilst oxide on the pinch wheel and guides may cause tape slipping—apparent to the listener as a variable change in pitch of the recorded sounds.

We recommend the cleaning kit marketed by Messrs. METRO-SOUND M.F.S. Co. Ltd., BRIDGE WORKS, WALLACE ROAD, CANONBURY, N.1, and known as KLENZATAPE. This kit will enable the heads to be quickly and efficiently cleaned.

The tape guides and pinch wheel should be cleaned with methylated spirits, but care should be taken to prevent this spirit being spilt on the plastic head covers. Methylated spirits may also be used on a lightly dampened linen cloth for cleaning the heads. Oiling is unnecessary as all bearings are of the oil-retaining type.

Brenell

MARK 5 TYPE M SERIES 3

SPECIFICATION

Four tape Speeds 1⅞, 3¾, 7½ and 15 IPS.

Separate Record and Replay Heads

Separate Record and Replay Amplifiers

Internal Speaker: 9" × 5" elliptical.

Wow and Flutter less than:
0·05% at 15 IPS. 0·1% at 7½ IPS.
0·15% at 3¾ IPS. 0·25% at 1⅞ IPS.

Working Voltage: 200/250v., 50 c/s or to order 110v., 60 c/s

Record/Replay/Response:
15 IPS., 40 c/s to over 20,000 c/s ± 3dB.
7½ IPS., 40 c/s to 18,000 c/s ± 3dB.
3¾ IPS., 40 c/s to 13,000 c/s ± 3dB.
1⅞ IPS., 40 c/s to 6,000 c/s ± 3dB.
Measured at Ext. Amp. Socket across 47 K ohm load.

Amplifier Response: 25 c/s to 26 Kc/s ± 3dB.

Signal to Noise Ratio:
Unweighted—Including Hum. 45 dB at 7½ IPS.

Recording Amplifier Sockets:
Microphone—1 mV (1 Megohm Impedance).
Radio—25 mV (500 Kilohms Impedance).
(May be mixed—separate gain controls).
Monitor for Headphones (2,000 ohms or higher).

Replay Amplifier Sockets:

Straight amp—
Input for High Impedance Microphone or Low Level Radio Tuner:—(Sensitivity 3[illegible] mV. Impedance 1 Megohm).

Outputs **Ext. Speaker** (15 ohms).
External Amp. (200 mV. across 47 K ohm load).

Recording Medium:
Standard ¼" plastic, coated tape on reels up to 8¼" in diameter.

Track Width: ·095" displaced to one edge.

Track Sense:
To International Standards (Upper Track operative—Tape movement L to R across heads).

Number of Tracks: Two.

Playing Times per reel:

	1⅞ IPS.	3¾ IPS.	7½ IPS.	15 IPS.
2,400' 7" Double Play Tape	8 hrs.	4 hrs.	2 hrs.	1 hr.
1,800' 7" Long Play Tape	6 hrs.	3 hrs.	1½ hrs.	45 mins.
1,200' 7" Standard Tape	4 hrs.	2 hrs.	1 hr.	30 mins.

(add 50% to above times 8¼" Reels of Tape)

Rewind Time:
Approximately 60 seconds per 1,200' of Tape.

Mixing Facilities. The Radio and microphone input circuits designed to enable the input signals to be mixed before recording. Each input has its own volume control.

Power Output: 2 Watts R.M.S.

Treble Control: 12 db variation at 15 Kc/s.

Bass Control: 12 db variation at 100 c/s.

Power Consumption: 120 Watts.

Overall Dimensions: 18" × 17" × 9".

Natt Weight: 40 lb.

Valve Compliment:

Recording Amplifier:	ECC 81	2 ECC 83	
Replay Amplifier:	1 EF86	1 ECC 83	1 EL 84
Oscillator:	EL84		
Power Unit:	EZ80		

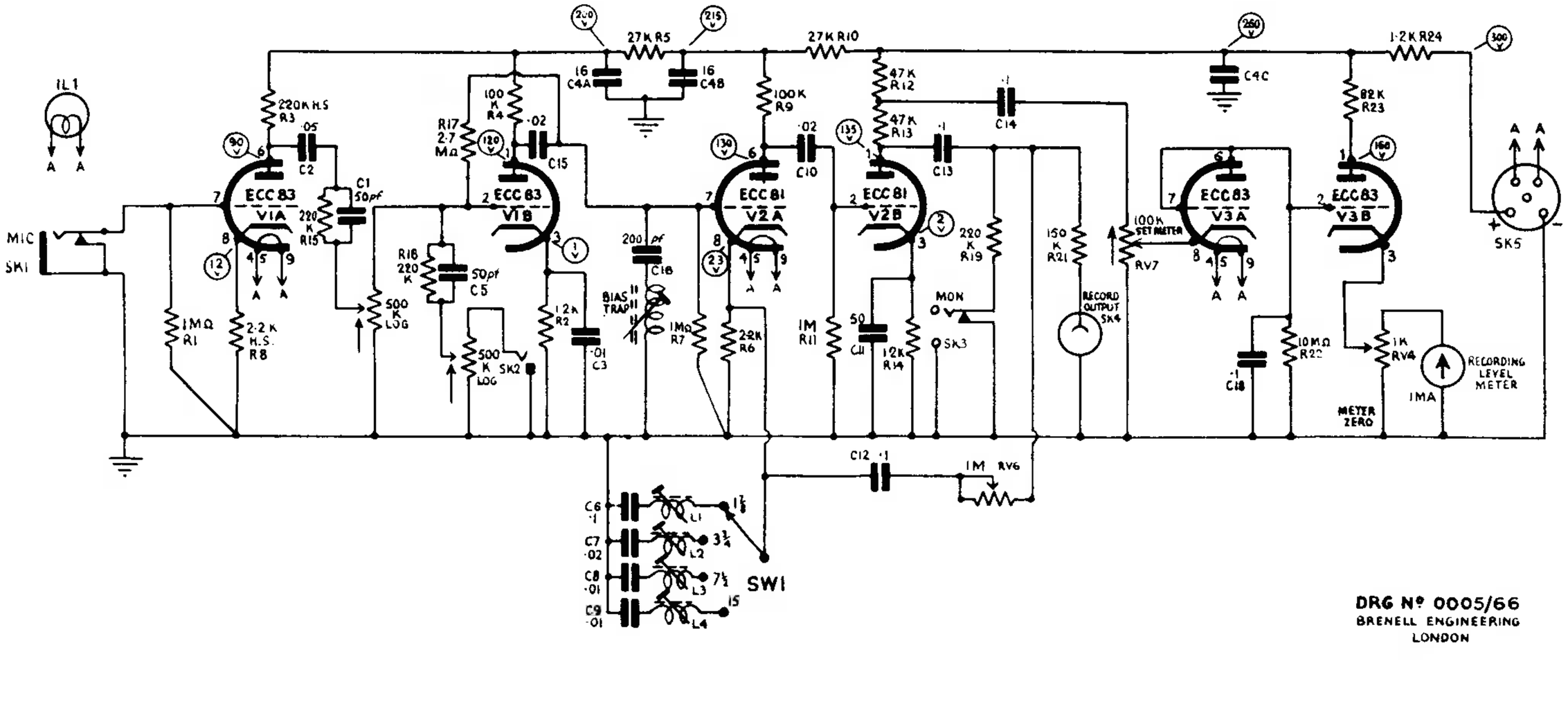
Brenell Engineering reserve the right to alter the specification as modifications are made.

Sole Manufacturers

BRENELL ENGINEERING CO LTD

231-235 Liverpool Road London N1 Telephone NORth 8271 (5 lines)

RECORDING AMPLIFIER UNIT



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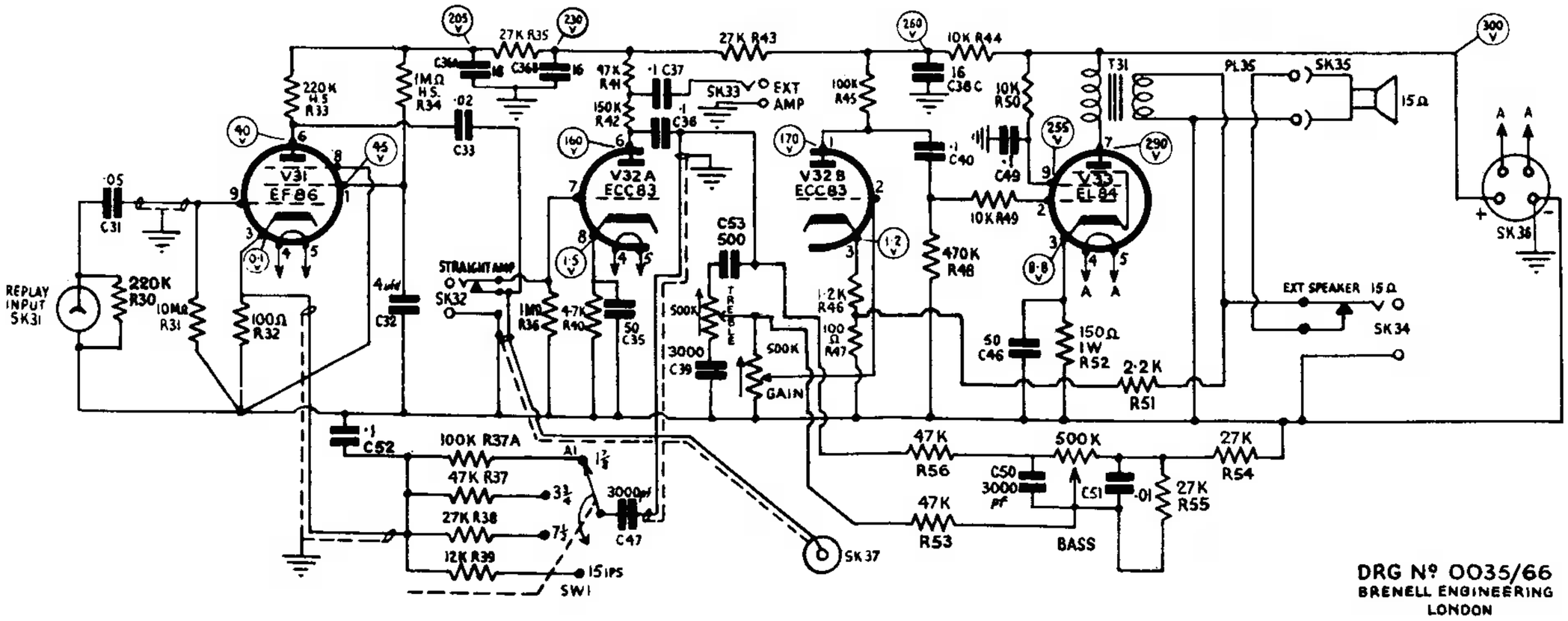
REPLAY AMPLIFIER UNIT



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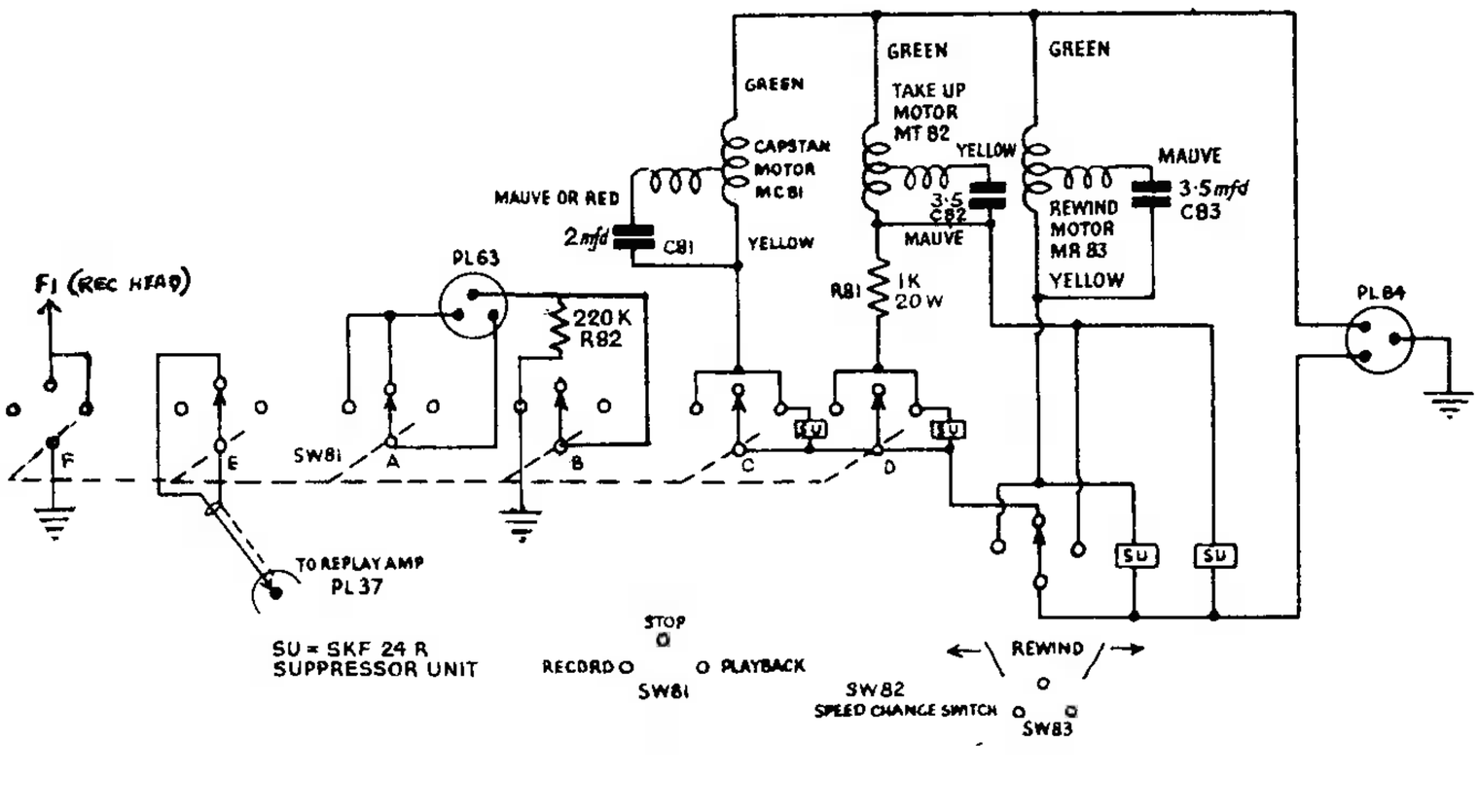
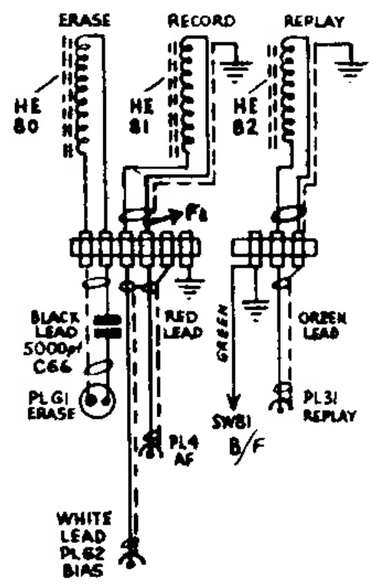
TAPE DECK CIRCUIT



HEAD WIRING



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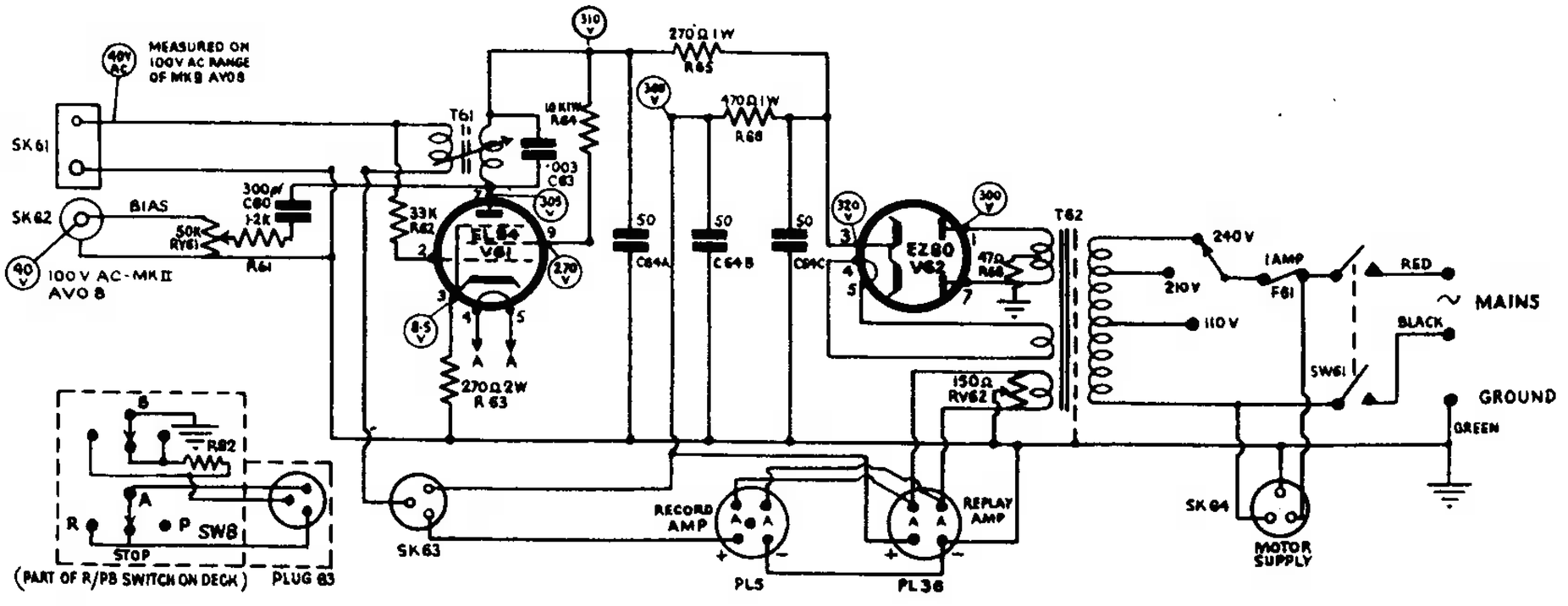
OSCILLATOR/ POWER SUPPLY UNIT



ALL VOLTAGES MEASURED WITH AVO 8 METER (ALL CONTROLS ANTI-CLOCKWISE)
ALL RESISTORS ± 10% ½ W UNLESS OTHERWISE INDICATED
ALL CAPACITORS GIVEN IN µF UNLESS OTHERWISE INDICATED

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